METER - RELAY

INSTRUCTIONS

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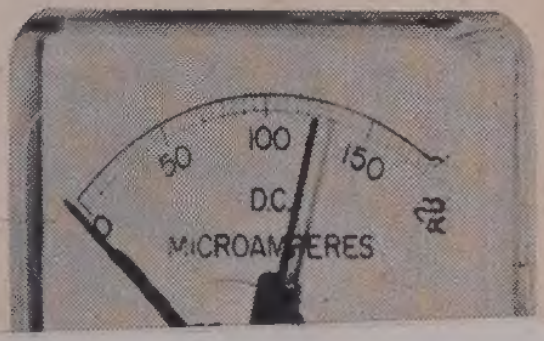

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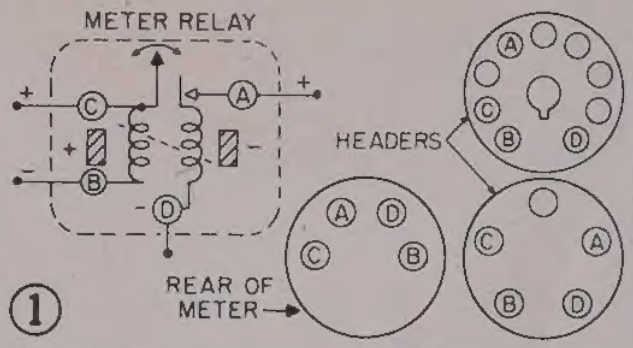
Mail Aaaress:
ASSEMBLY PRODUCTS, Inc.
CHESTERLAND, OHIO

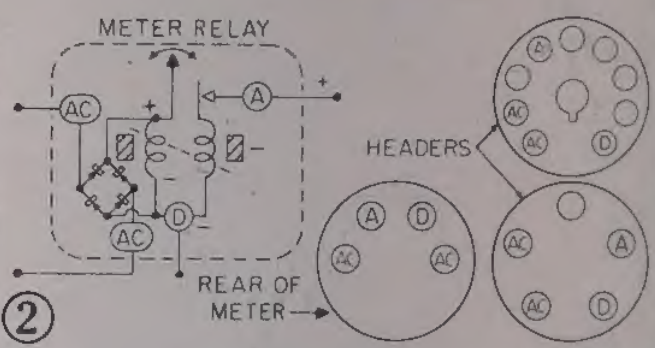
Telephone: (Cleveland, Ohio) HAmilton 3-4436

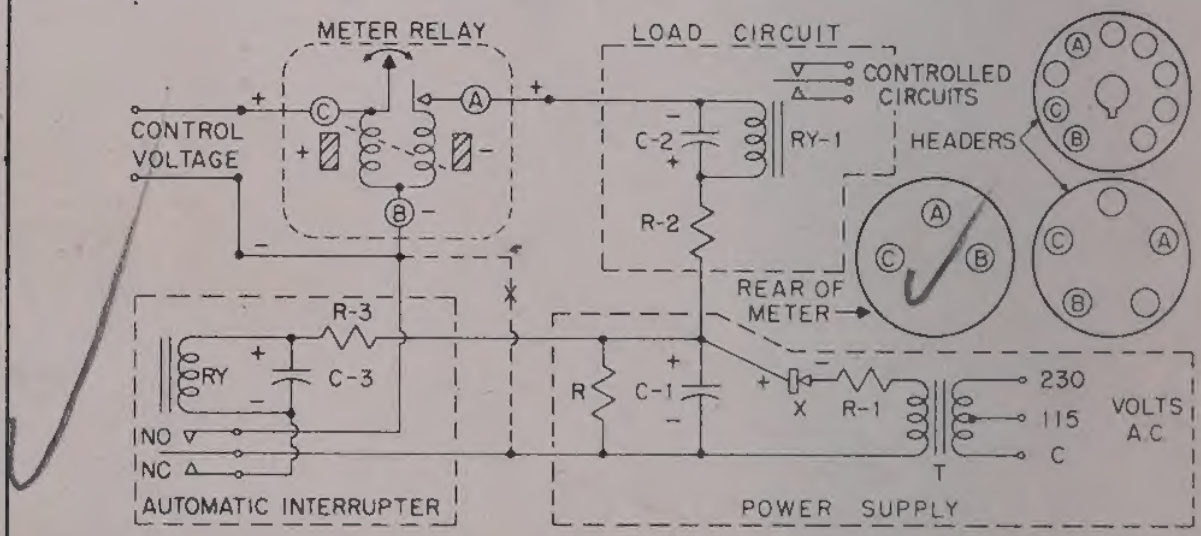
BASE CONNECTIONS - SINGLE CONTACT HIGH LIMIT

ISOLATED LOCKING - SINGLE CONTACT - HIGH LIMIT



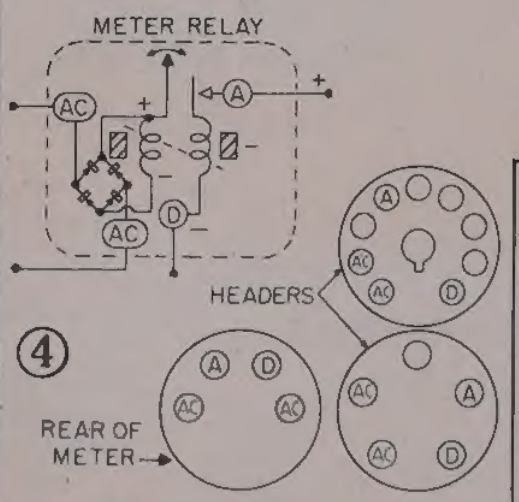
A.C. METER - SINGLE CONTACT - HIGH LIMIT





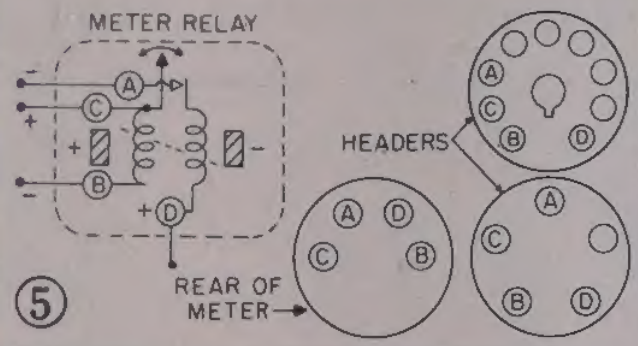
3 STANDARD SINGLE CONTACT - HIGH LIMIT

A.C. METER ISOLATED LOCKING - SINGLE CONTACT HIGH LIMIT



BASE CONNECTIONS-SINGLE CONTACT LOW LIMIT

ISOLATED LOCKING-SINGLE CONTACT-LOW LIMIT



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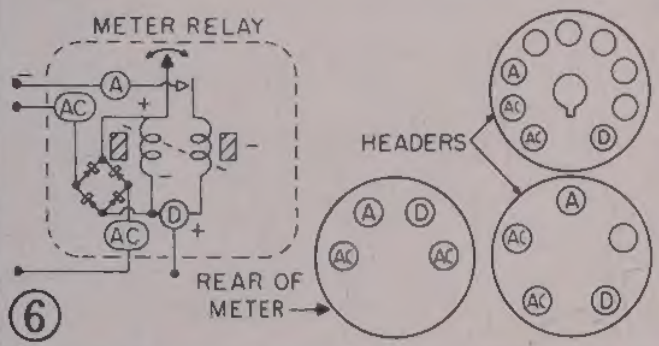
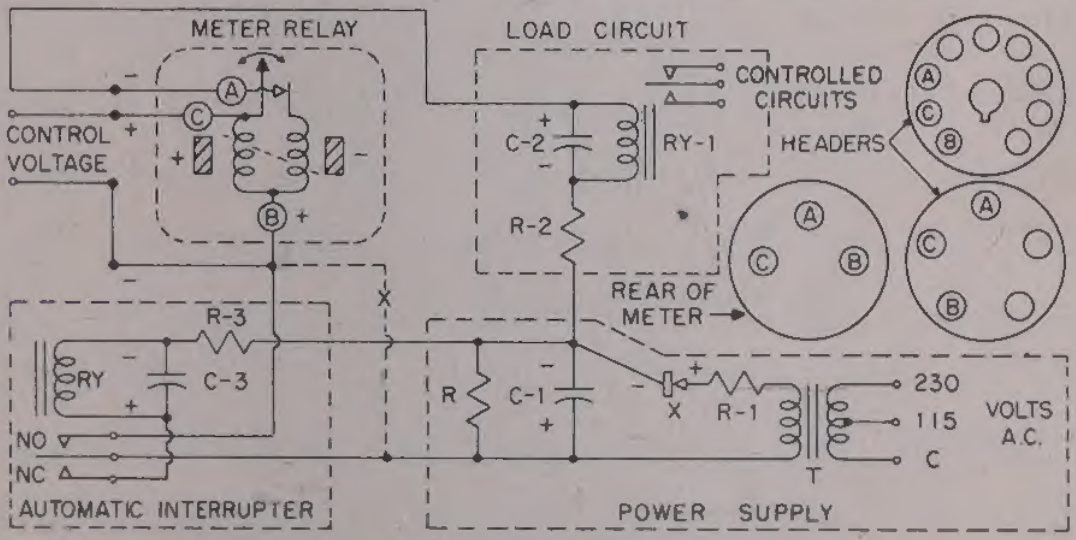
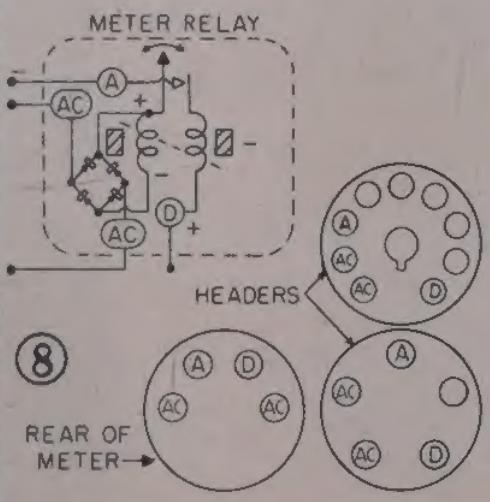


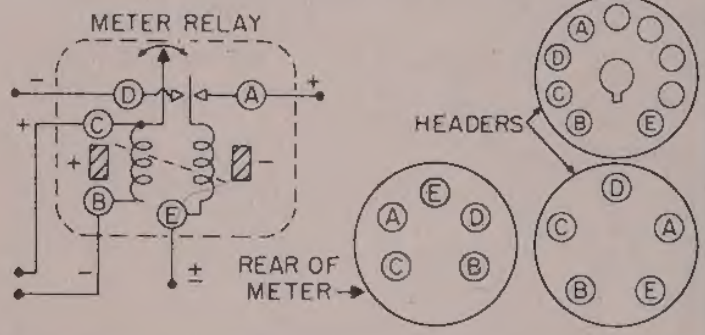


7 STANDARD SINGLE CONTACT-LOW LIMIT

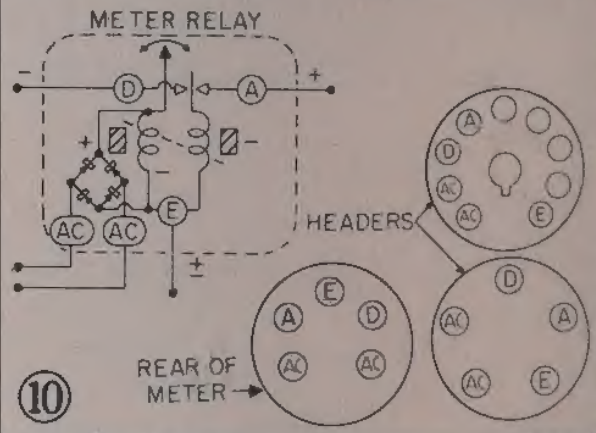
A.C. METER-ISOLATED LOCKING-SINGLE CONTACT-LOW LIMIT



⑨ ISOLATED LOCKING DOUBLE CONTACT



A.C. METER-DOUBLE CONTACT



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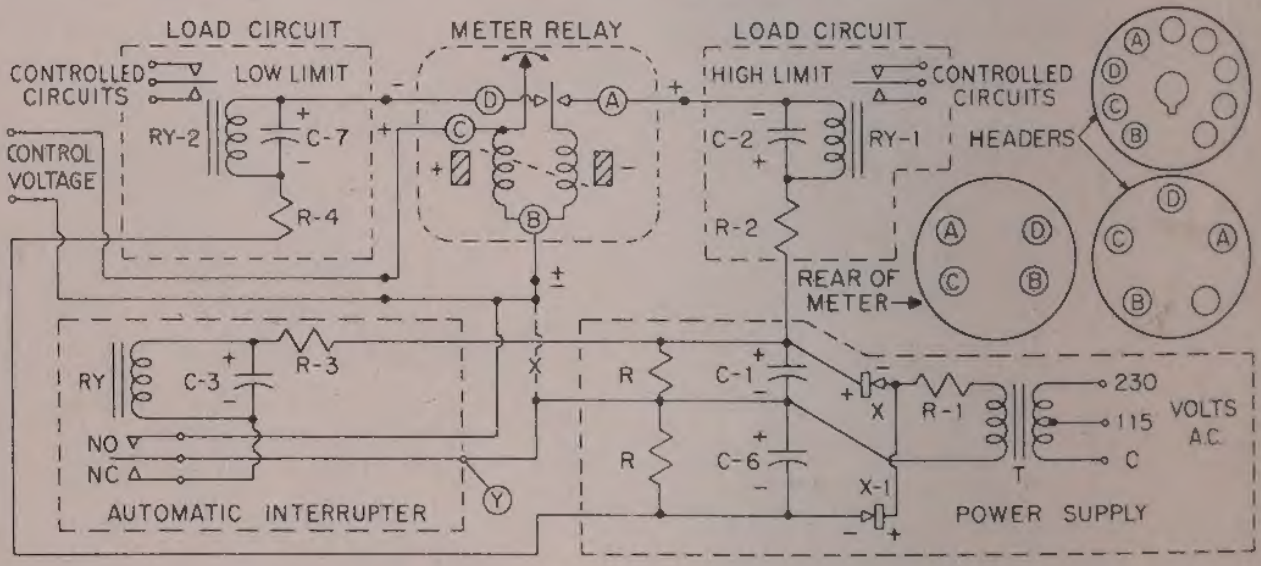
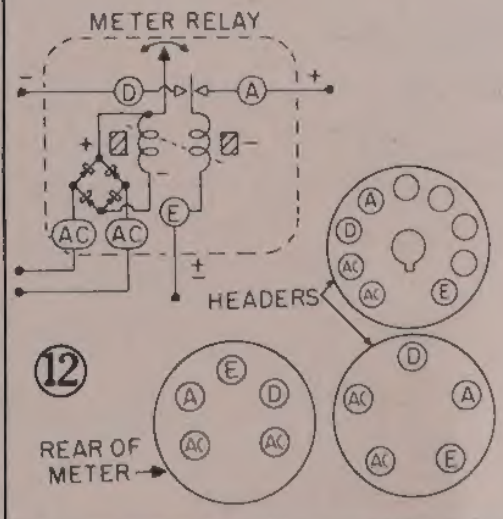


⑪ STANDARD DOUBLE CONTACT

A.C. METER DOUBLE CONTACT ISOLATED LOCKING



⑫

GENERAL DESCRIPTION

The meter-relay is essentially a meter with built in Micro-Contacts. There are two windings on the moving element---the signal or indicating winding (referred to as the meter winding) and the contact locking coil. Current in the meter winding turns the element to the point of contact.

When the contacts touch a small current starts to flow. This may be very small at first but even a minute current in the locking coil assists the meter coil to build up contact pressure. This reduces contact resistance allowing full current to flow, securely locking the contacts. To release the contacts, break the circuit externally. A spring separates them forcefully.

METER (INDICATING) CIRCUIT

The construction is similar to a regular panel meter of the same range and the input circuit is handled in the same manner. Shunts or series resistors may be used to change the range. Rectifiers or thermocouples are used for A.C. or R.F. Check all connections before turning on power to the contact circuit. Meter-relays are not guaranteed against burn out.

CONTACTS

Solid platinum alloy contacts used in meter-relays are small and delicate. They must be protected from arcing. Contact rating is determined by turns on the locking coil. Either too low, or too high current may cause erratic contact operation.

One contact is carried on the black meter pointer. The other is spring mounted on the red setting pointer. Since the locking action is a result of the contact current, only D.C. of the correct polarity is used.

MOUNTING

Meter-Relays are balanced for mounting in any position unless specified otherwise.

Steel panels will cause them to read 5% to 15% low depending on the model. To overcome this meter-relays are calibrated high at the factory so they will be correct when installed. They are marked for non-magnetic or magnetic (steel) mounting. A meter calibrated magnetic will read high unless mounted in a steel panel.

SHOCK MOUNTING

Meter-relays will stand about the same amount of shock and vibration as ordinary panel meters. For most appli-

cations no special precautions are needed. For excessive shock or vibration they may be cushioned with rubber shock mounts.

CLEANING

The crystal polystyrene cover is attacked by hydrocarbon. Do not attempt to clean with carbon-tet, gasolene or other solvents. It can be washed with soap and water.

STATIC

The meter fronts are treated with an anti-static material. In some climates they may still show some static effect. If it is troublesome send for our anti-static wax which will be supplied free on request. Rub some on. Wipe it off with a soft rag. Don't wipe it too clean. Leave the surface looking greasy.

CONTACT PYROMETERS

These are millivolt meter-relays calibrated for use with thermocouples. They have bimetal compensation for cold junction and have copper error correction. Except for the thermocouple circuit they are treated like other meter-relays.

Thermocouples & External Resistance

The correct type of thermocouple and maximum external

resistance are shown on the meter-relay dial. A thermocouple calibrating resistor is supplied with each meter. It has a resistance of one half ohm per turn.

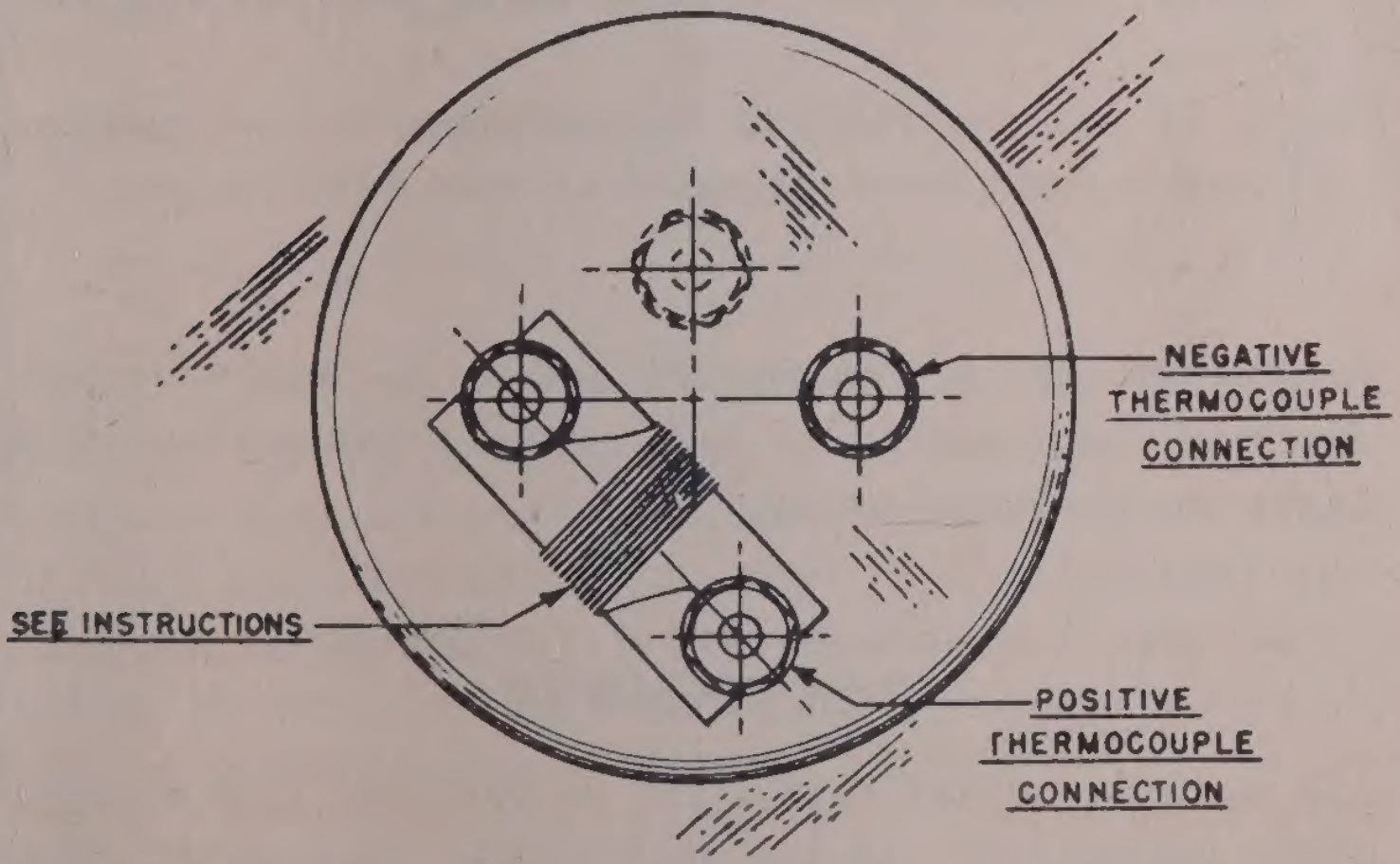
Table 1 shows the resistance of different types and sizes of thermocouple wires. With this it is necessary to know only the length of the thermocouple to determine the ohms. Take turns off the calibrating resistor at the rate of one turn for each half ohm.

Table 1

Thermocouple Resistance

	Ohms per foot		Total for pair of wires.		
Gage B & S	Iron-Constantan	Chromel-Alumel	Gage B & S	Iron-Constantan	Chromel-Alumel
8	.0215	.0367	20	.3490	.5931
10	.0342	.0582	22	.5547	.9424
12	.0545	.0928	24	.8812	1.493
14	.0866	.1472	26	1.402	2.382
16	.1380	.2345	28	2.225	3.781
18	.2198	.3735	30	3.325	5.970

Example: A catalog 1664 pyrometer is used with a number 2050-1 Iron-Constantan thermocouple which has five feet of 20 gage wire with a total resistance of 1.7 ohms. Take three turns off the resistor. This adjusts it to the nearest half ohm which is close enough.



Be sure all connections are tight. A loose connection may cause erratic readings.

ZERO SETTING (PYROMETERS)

There is a small bimetal compensator which moves the meter pointer to agree with the internal temperature of the meter. This is set at the factory but may need

touching up from time to time. Do it as follows.

1). Allow thermocouple to cool.
2). Set small thermometer near tip of thermocouple.
3). Turn small black screwdriver adjustor (on face of meter) to make meter reading agree with thermometer.

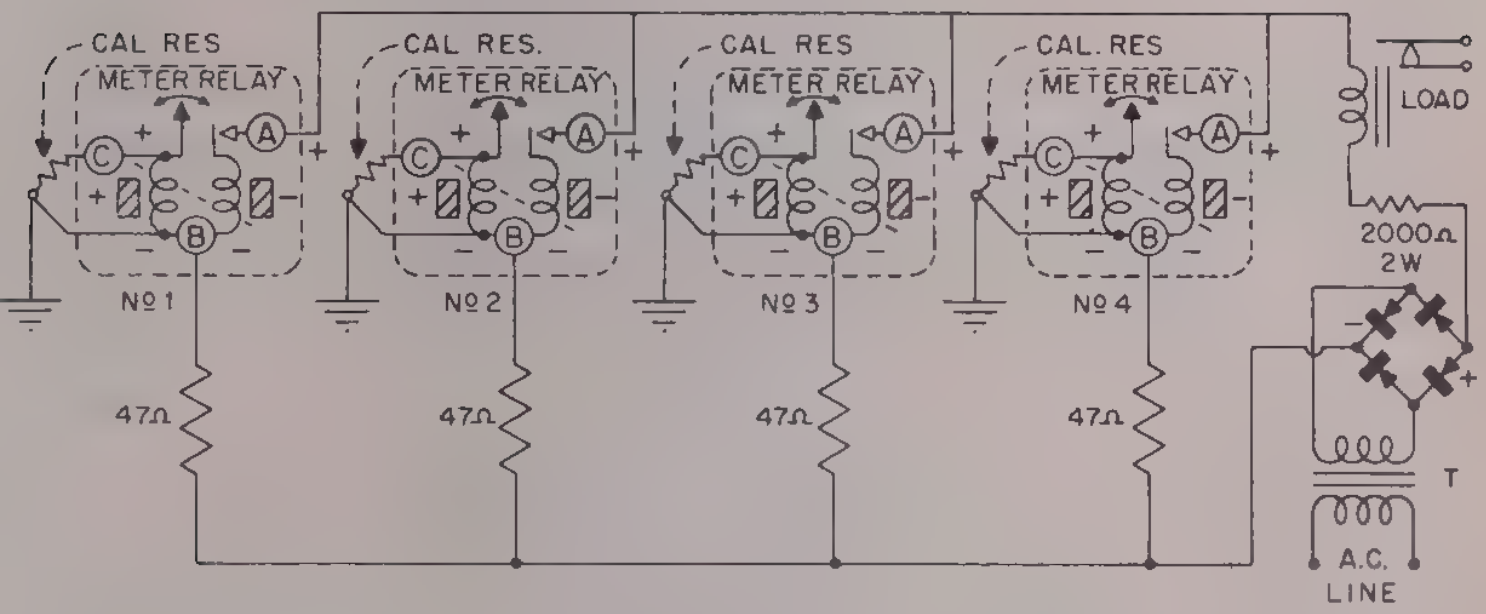
Note:- If more convenient thermocouple can be disconnected and meter adjusted to room temperature.

Suppressed zero pyrometers can not be adjusted this way. These are adjusted while indicating a temperature that falls on the meter scale.

POLYPOINTS

Any number of meter-relays can be operated from a single power supply and with one interrupter. Each meter-relay can work into its own load relay or all may operate a single load.

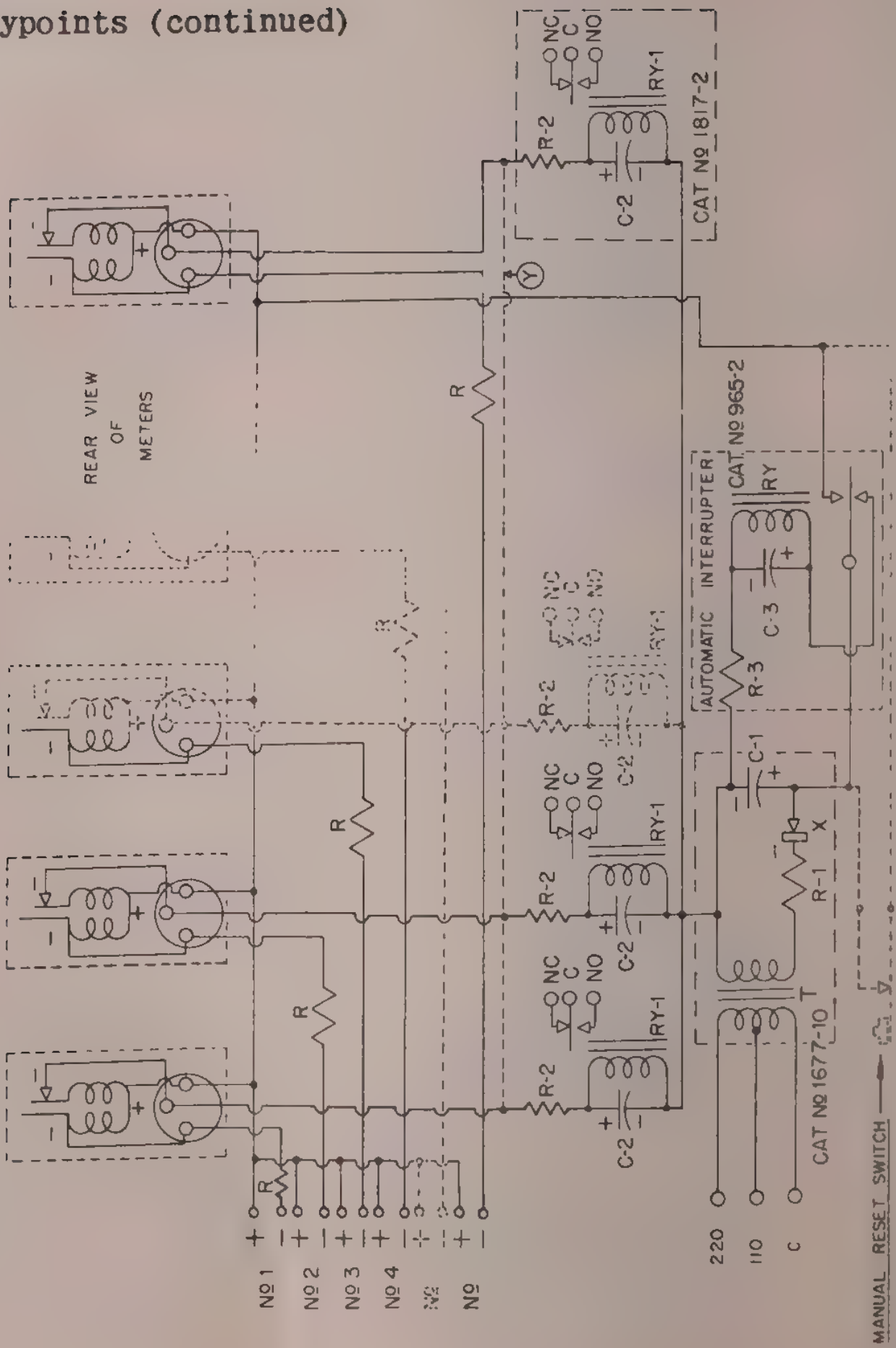
Pyrometer polypoints require special consideration if the thermocouples will be grounded at their tips. The thermo EMF between the couples and ground may cause an error.



Small isolating resistors in the common B lead will isolate the thermocouple circuits but there will be feedback from the contact circuit. When a contact closes, voltage drop across the isolating resistor feeds back into the thermocouple circuits causing all other meter-relays to trip. For an alarm or safety shutdown this may not be objectionable.

For most applications it is better to use contact pyrometers with reversed polarity input (positive input to common B). The positive element of base metal thermocouples (I/C, C/A, C/C) has little thermo electric effect with ground (frames of machines). Of course, if the thermocouples are insulated from ground there is no problem.

Polypoints (continued)



HEAVY DUTY CONTACTS

Some meter-relays have an auxiliary pair of contacts which are actuated by the locking coil. They are rated ½ ampere at 125 volts A.C. or 32 volts D.C. Since there is a common connection between one of the heavy duty contacts and the locking coil circuit watch out for cross connections in the circuitry.

POLARITY

All windings in a meter-relay are polarized. If the wrong polarity is applied to any terminal the action will be wrong. The polarity inside the meter-relay can not be changed after it is built. The circuit must be adapted to the meter-relay.

RUGGEDIZED METER-RELAYS

The V.H.S. Relay and all ruggedized models have the same electrical characteristics and can be used in the same circuits shown in this booklet. Since they are internally shock mounted they can be used under heavy shock or vibration conditions.

GUARANTEE

All meter-relays are covered by our standard guarantee against defects of material or workmanship for one year. This guarantee is void if the cover is removed or if the instrument has been damaged either mechanically or electrically.

DAMAGE OR LOSS IN SHIPMENT

Assembly Products, Inc., carries insurance on all shipments from our plant. If you receive an instrument that was damaged on arrival, notify us at once and return the instrument to us for repair or replacement. Shipments to our plant should be protected by the customer.

When a damaged instrument is received at our plant we will assume it was damaged by the customer unless we have been notified.

EXCHANGE OR REPAIR POLICY

(Outside Guarantee)

1). Those needing only minor repairs will be charged on a time and material basis.

2). Those of old style, or requiring extensive repairs will be replaced with new instruments at 50% of the current catalog price of the new instrument.

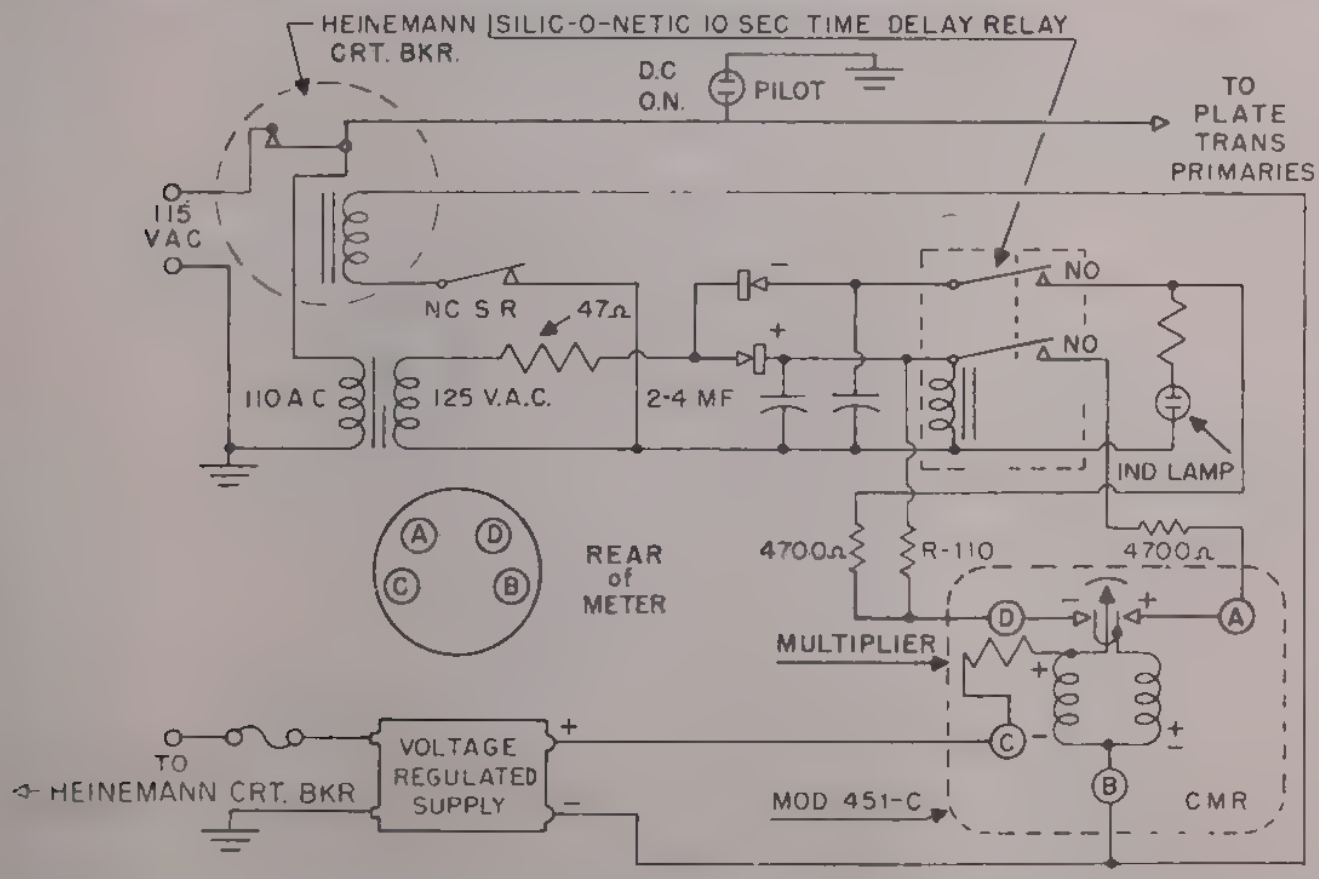
Customers can take advantage of this 50% allowance to change to a different range or model regardless of the condition of the old meter-relay turned in.

The Flutter Circuit

Low Limit Meter-Relays (or double contact).

In many cases low limit contacts are normally closed prior to turning on the equipment. To start up, power is held off the contact circuit till the meter input is above the trip point. This may be done manually or with a time delay. However, if the trip point is near the normal operating level, the contacts may stick and fail to open.

The 'Flutter Circuit' overcomes this trouble. Voltage of the wrong polarity is applied to the contacts until they

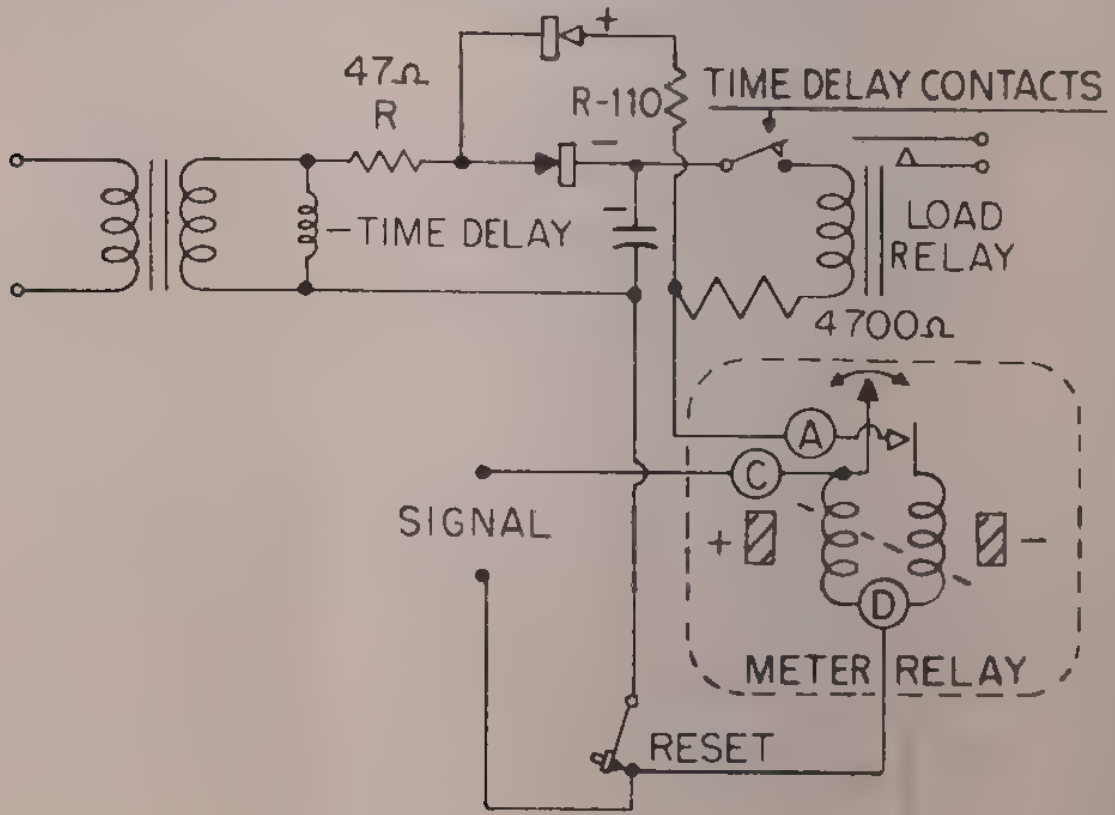


OVER VOLTAGE-UNDER VOLTAGE PROTECTIVE CIRCUIT

are activated. Current flowing the wrong way through the locking coil makes the contacts repel--they flutter till the input separates them.

A voltage regulated power supply made by Power Designs, Inc., illustrates this problem. 100 volts normal output of the supply is monitored by a Model 351-C double contact voltmeter. Trip points are set at 98 and 102 volts. Normally open contacts on a Silic-O-Netic time delay relay de-activate the meter contacts till the power supply warms up.

This sets up the conditions described above. The moving contact may stick against the low limit contact. This



sticking gets worse with use. Adding a 100,000 ohm resistor (R-110) sets up the flutter circuit. This assures the contacts separating when the power supply rises above 98 volts.

Contact Voltage and Its Effect on Calibration

Electrostatic attraction between the contacts may pull them in when they get close. On very sensitive relays this may change the trip point considerably. The following measurements were made on a VHS Model 266 with contact voltage (open circuit) ranging from 4 to 175 volts.

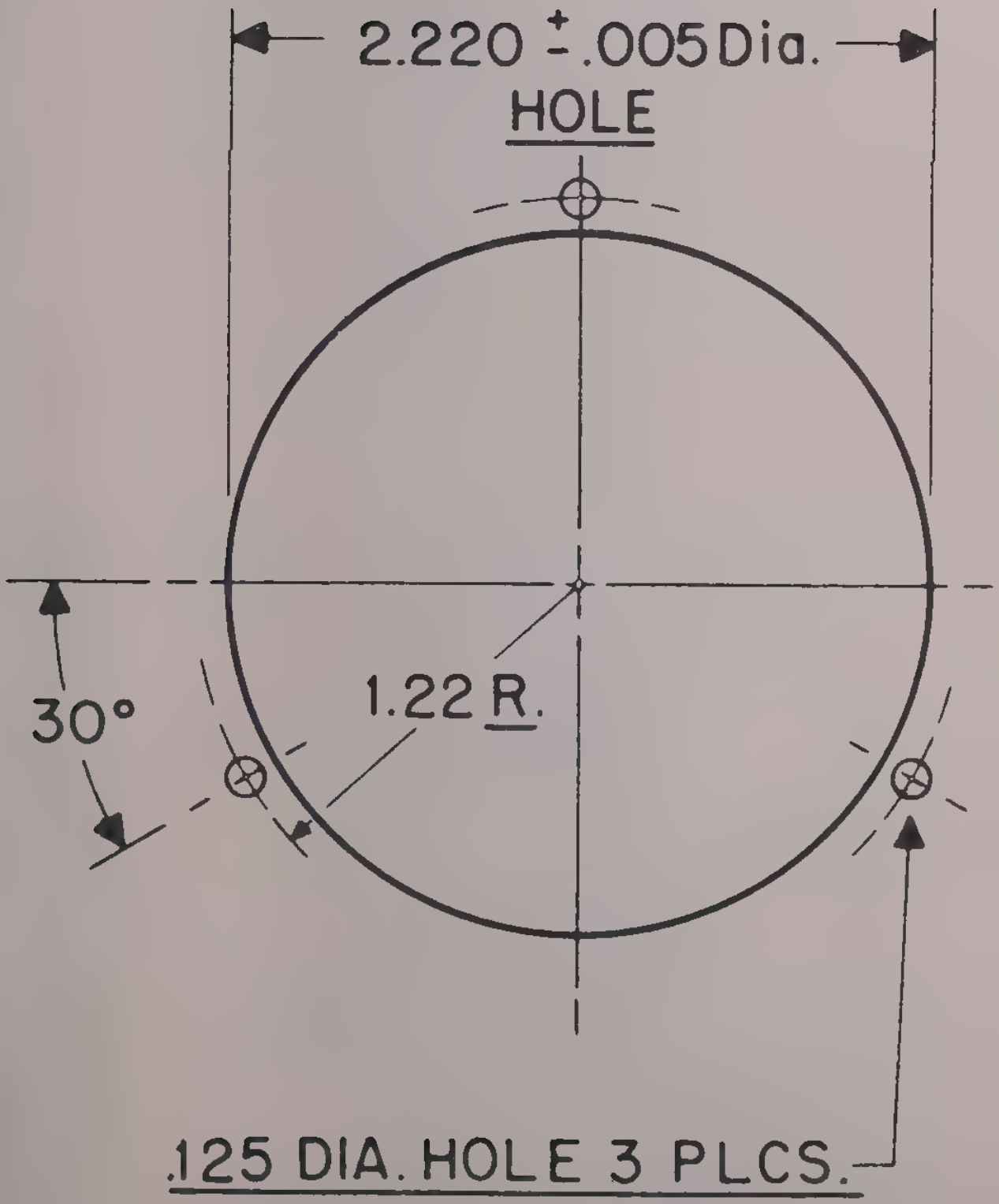
Contact Voltage (open circuit)	Trip Point Microamperes
4	1.8
25	1.6
50	1.4
75	1.24
100	1.21
125	.9
150	.72
175	.45

These figures show it is necessary to allow for this variable in the specifications. Meter-relays are calibrated for 100 volts on the contacts unless specified

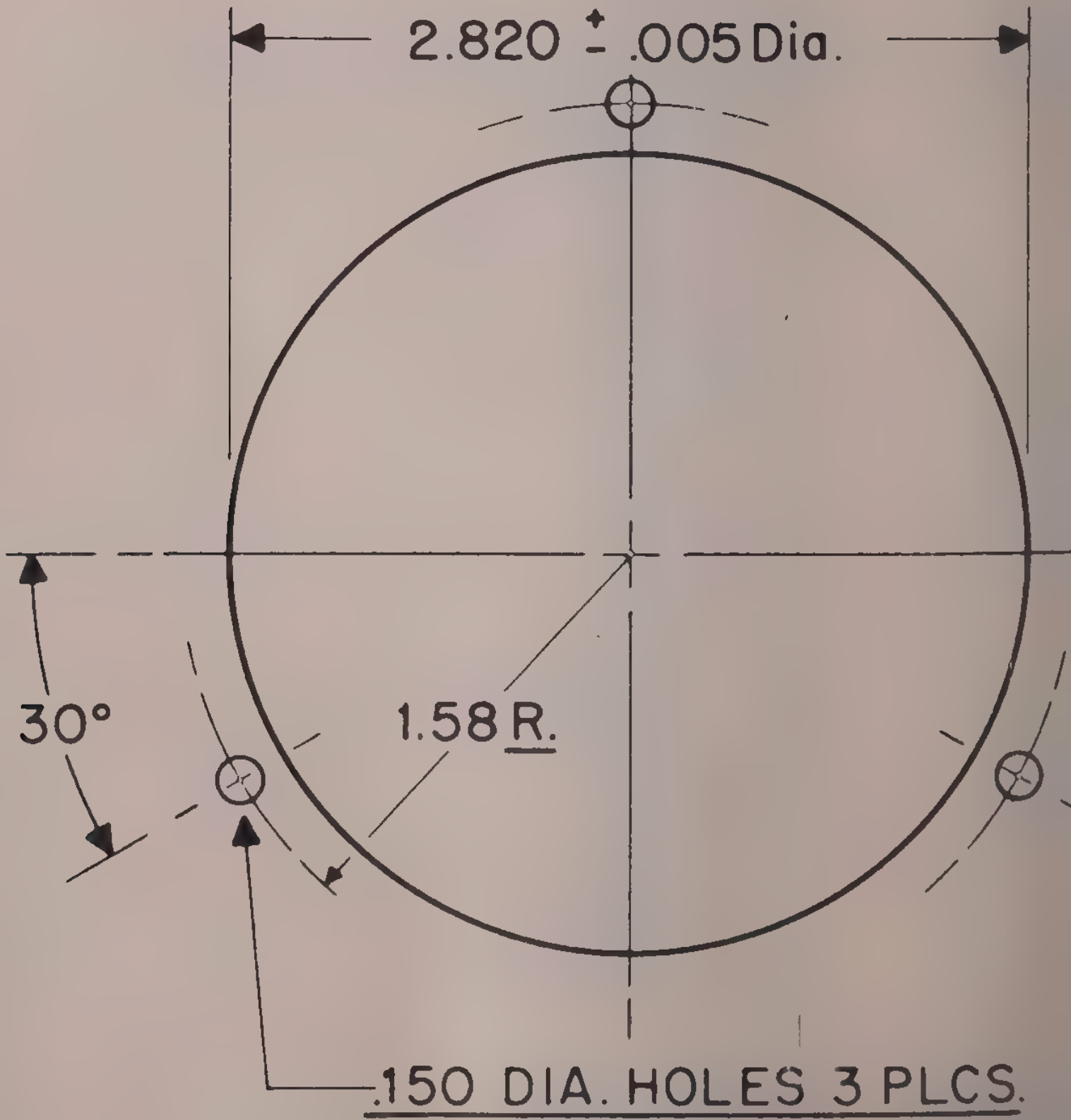
otherwise.

On ranges above 100 microamperes or above 10 millivolts this electrostatic effect is hardly noticeable. Indicating models 261-C, 351-C, 451-C, etc are not disturbed except on the most sensitive ranges where it will show by early pull in.

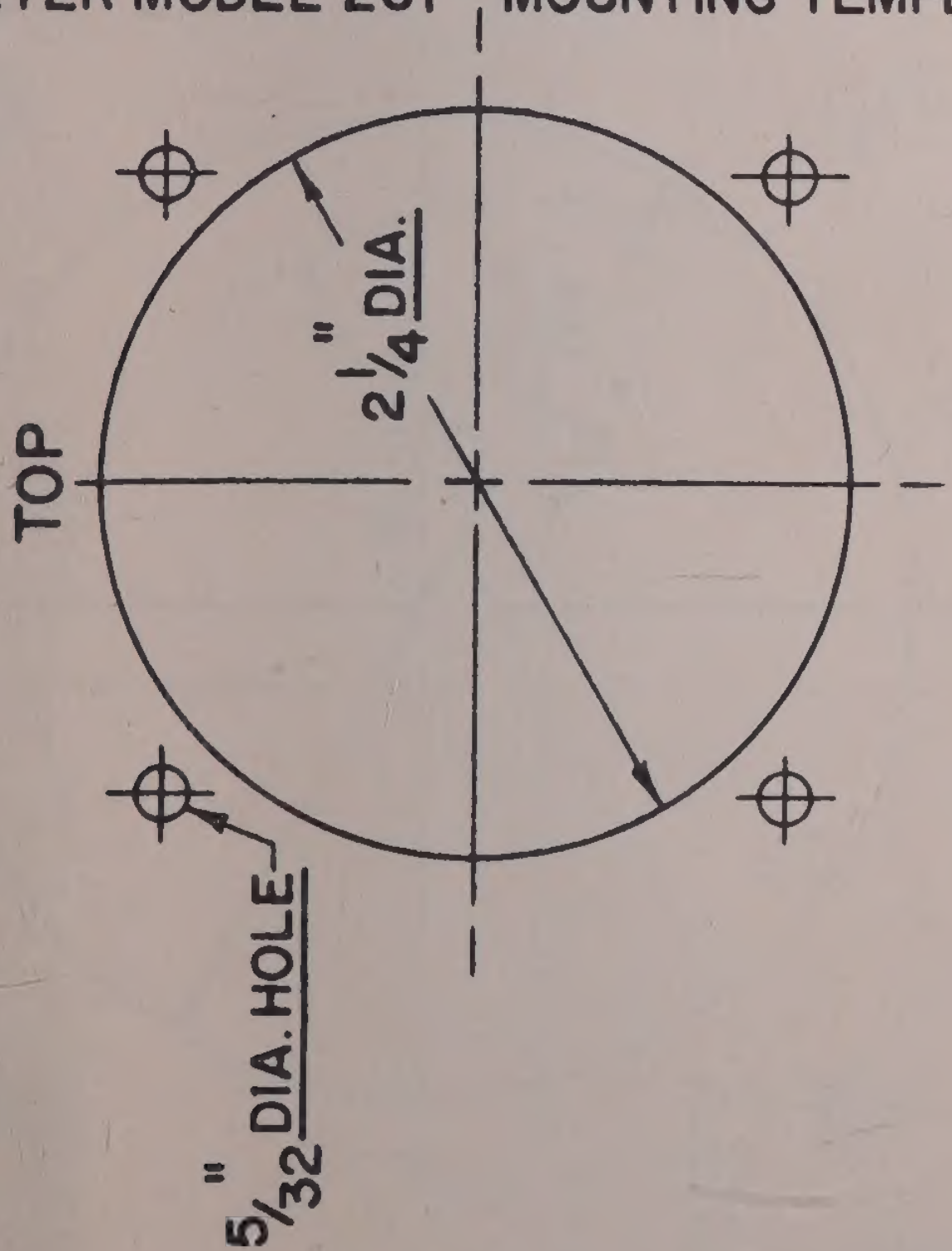
Mod. Nº 255



DRILLING PLAN Mod. Nº 355

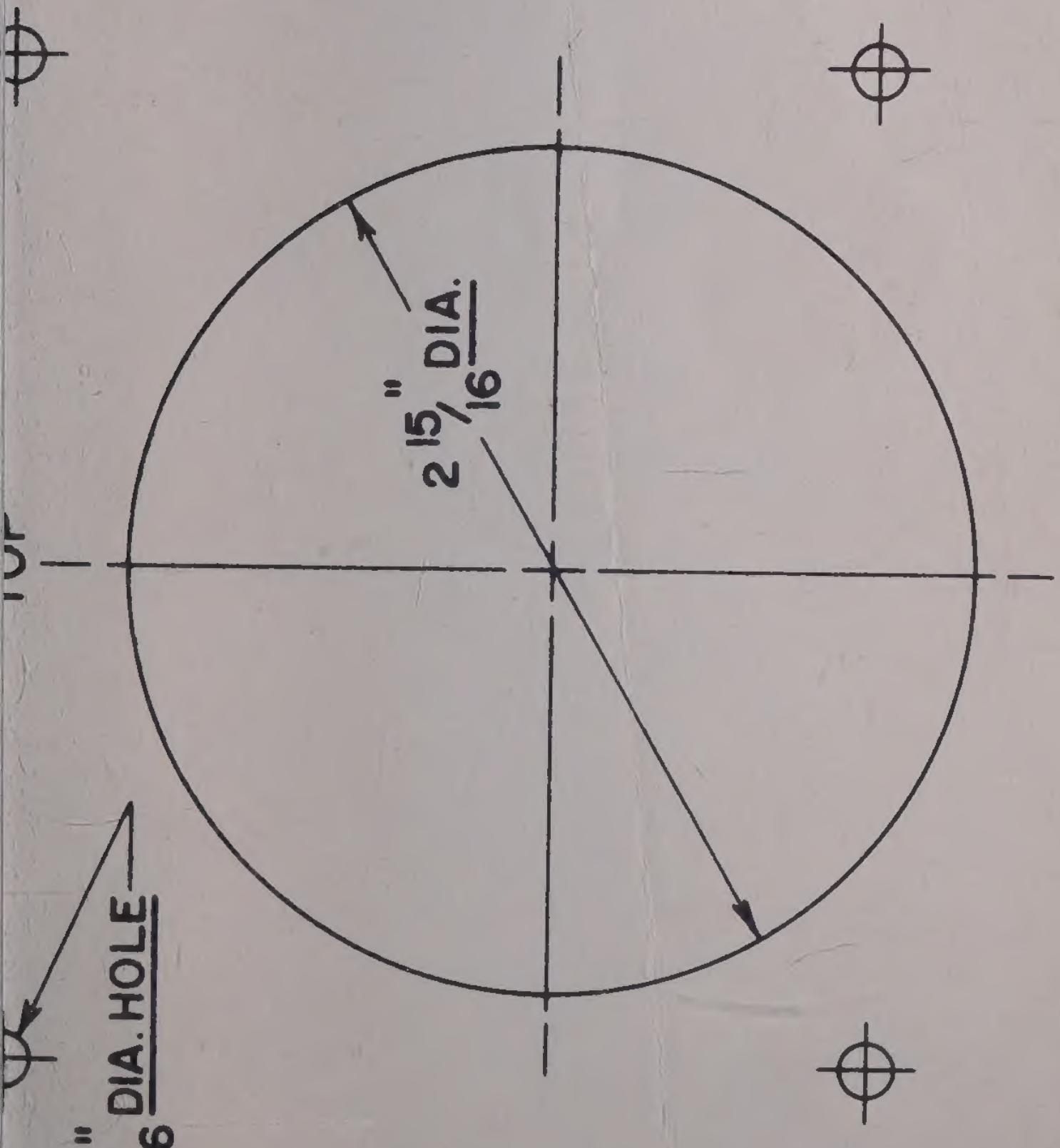


METER MODEL 261 MOUNTING TEMPLATE



METER MODEL 351 MOUNTING TEMPLATE

METER MODEL 451 MOUNTING TEMPLATE



Special Connections For _____

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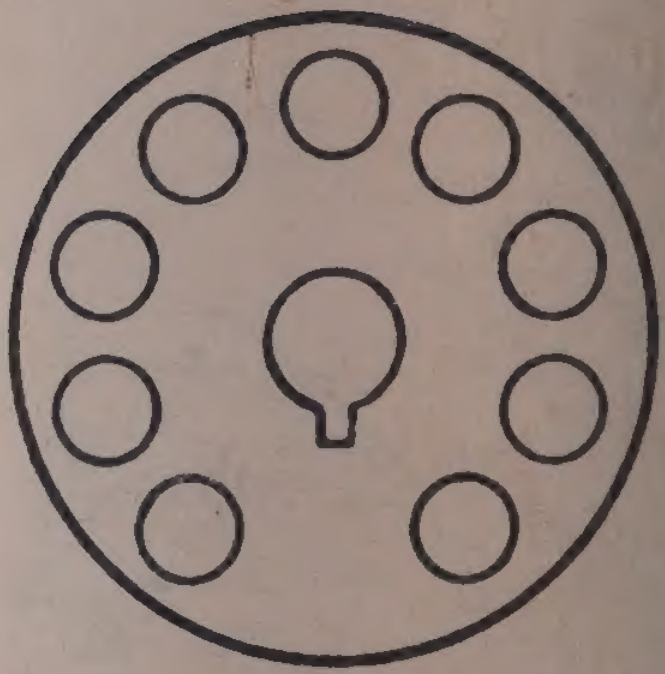

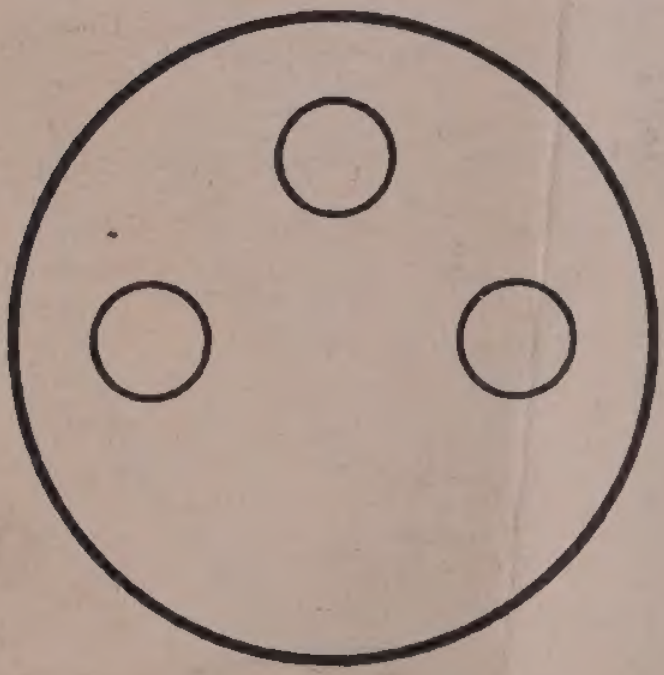

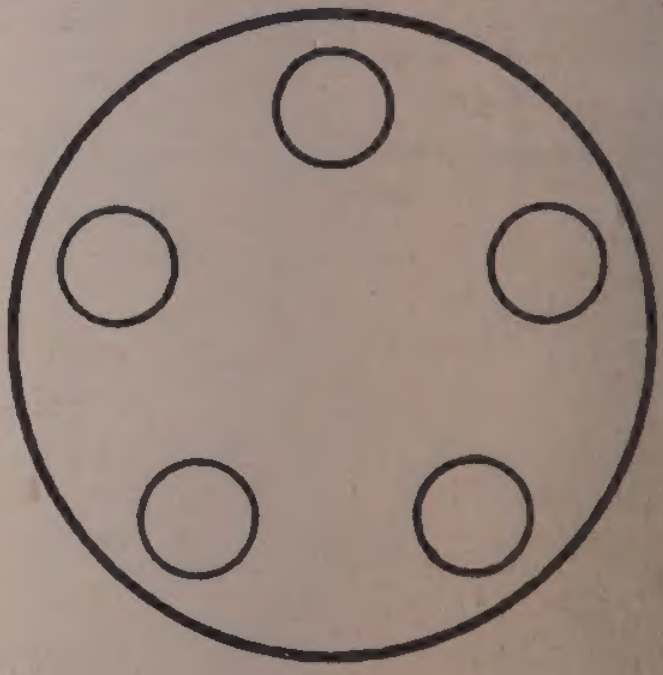

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